EUROGRAPHICS 2022 / R. Chaine and M. H. Kim
(Guest Editors)

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An Invitation to Borrow Ideas from Other Domains

Sylvain Paris

Adobe Research

Abstract

Interdisciplinary research is common in Graphics. We often borrow ideas from other communities or combine algorithms developed in other contexts to create something new. Some pairings have become classics like computer vision & image editing, and numerical optimization & simulation. In this presentation, I will go over a few recent interdisciplinary trends that I had the chance to witness and that have impacted my work. We will talk about compilers, music, natural language, and, of course, AI. I will use these examples to illustrate a few of the powerful techniques developed in these other fields. I will also show how they found their way into real-world applications. I will conclude by sharing my experience being part of some of these projects. I hope that this discussion will encourage everyone to continue to borrow ideas from other fields to create the next wave of exciting research.

Biography

Sylvain Paris is a Fellow and a Lab Director at Adobe Research. His personal research interests are about photo editing and related topics. His team covers various aspects of machine learning, computer graphics, computer vision, cognitive science, programming languages, and audio. Several of their research contributions have become popular features in products like Photoshop, Lightroom, and Premiere. Sylvain served several times on the program committee of conferences like SIGGRAPH, Eurographics, and CVPR, and on the editorial boards of journals like Transactions on Graphics and Transactions on Computational Imaging. In 2021, he chaired the Technical Papers program of SIGGRAPH. Before joining Adobe in 2007, he worked with François Sillion at INRIA to prepare his PhD that he received from Université Joseph Fourier in Grenoble in 2004, and he then did a post-doc at MIT with Frédo Durand.

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Perceiving Humans Using AI

Jan Kautz

Nvidia

Abstract

Perceiving humans, such as their pose, gaze, etc., of great interest for many practical applications, including human-machine interaction, activity recognition, video analytics, visual effects, gaming, and any other application involving humans in the scenes. We will present our work focusing on a detailed understanding of the human body from monocular RGB images. Specifically, we will present deep learning methods for body pose estimation, mesh articulation from videos, global pose recovery, and hand pose estimation. We will show how deep learning models can be made robust to face challenges posed by real-world scenarios and address the problem of data scarcity for training these methods.

Biography

Jan Kautz is VP of Learning and Perception Research at NVIDIA. Jan and his team pursue fundamental research in the areas of computer vision and deep learning, including visual perception, geometric vision, generative models, and efficient deep learning. Their work has been awarded various awards and has been regularly featured in the media. Before joining NVIDIA in 2013, Jan was a tenured faculty member at University College London. He holds an undergraduate degree in Computer Science from the University of Erlangen-Nürnberg (1999), an MMath from the University of Waterloo (1999), received his PhD from the Max-Planck-Institut für Informatik (2003), and worked as a post-doctoral researcher at the Massachusetts Institute of Technology (2003-2006).

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Mesh Analysis for Archaeology

Ayellet Tal

Technion

Abstract

Shape analysis has numerous applications, both within graphics and in a variety of other fields. We concentrate on archaeology not only because cultural heritage has been acknowledged worldwide as an important goal, but also because the archaeological domain exposes the limits of current computer graphics techniques. Archaeological artifacts are not nicely-behaved; rather they are broken, noisy, stained and abraded, after laying underground for thousands of years. Developing algorithms that can handle such objects will therefore benefit not only archaeology, but also computer graphics. This talk will describe our ongoing work in this area.

Biography

Ayellet Tal is a professor and the Alfred and Marion Bär Chair in Engineering at the Technion's Andrew and Erna Viterbi Department of Electrical Engineering at the Technion. She holds a Ph.D. in Computer Science from Princeton University and a bachelor degree (Summa cum Laude) in Mathematics and Computer Science from Tel-Aviv University. Her research interests include computer graphics and computer vision. Among Prof. Tal's accomplishments are the Rechler Prize for Excellence in Research, the Henry Taub Prize for Academic Excellence, the Google Research Award, and the Milton and Lillian Edwards Academic Lectureship. Prof. Tal regularly serves on the program committees of all the leading international conferences in Computer Graphics and Computer Vision. She chaired several conferences on shape modeling and computer graphics and has been an Associate Editor of a number of professional journals.

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Going against the Flow of Fluid Animation

Mathieu Desbrun

Inria / Caltech

Abstract

While Computer Graphics (CG) has often been inspired by Computational Fluid Dynamics (CFD), its most commonly used algorithmic solutions to incompressible fluid animation remain limited in scope — they can only handle rather viscous fluids and/or low density ratios when simulating two-phase flows — and in scalability. As a consequence, they have found little to no industrial applications aside from special effects in movies and games. In this talk, I will discuss the Lattice Boltzmann Method (LBM) and its recent advances. Despite early works exhibiting underwhelming results, LBM solvers are now offering a promising, massively-parallel way to bridge the gap between CG and CFD for both incompressible single-phase and multi-phase fluid simulation using an atypical discretization of phase space. I will then review how hybridizing LBM with machine -learning based space-time upsampling of coarse simulations provides a rich computational framework for realistic and detailed smoke and fluid animation.

Biography

After obtaining a PhD in computer graphics in France, Desbrun joined Caltech as a postdoctoral fellow in 1998, and the CS department at the University of Southern California as an Assistant Professor in January 2000, where he remained for four years in charge of the GRAIL lab. He then became an Associate Professor at Caltech in the CS department in 2003, where he started the Applied Geometry lab and was awarded the ACM SIGGRAPH New Researcher award. He then became the Carl F. Braun Professor at Caltech, before receiving an International Chair from France's Inria, and being Technical Papers Chair for ACM SIGGRAPH 2018. More recently, he spent a sabbatical year at ShanghaiTech, was elected ACM Fellow, and became a member of the ACM SIGGRAPH Academy. He is now working in France as both a researcher at Inria Saclay, and a Professor at Ecole Polytechnique.